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# COMPUTER SCIENCE RESOURCES

2017

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# Welcome to the 2017 Computer Science Catalogue

**At Cambridge University Press we are driven by a simple goal: to create resources for teachers and students to ignite a curiosity and love for learning. Using the best authors and inspirational contributors, university expertise and external industry links, our aim is to innovate, inspire and raise education to a new standard.**

England's education system is going through a significant period with changes to the GCSE and A Level qualifications. Significant changes to assessment and content including an increased emphasis on computational thinking, programming and problem-solving skills require a different approach to teaching, and teachers will require ongoing support, guidance and answers to questions and concerns.

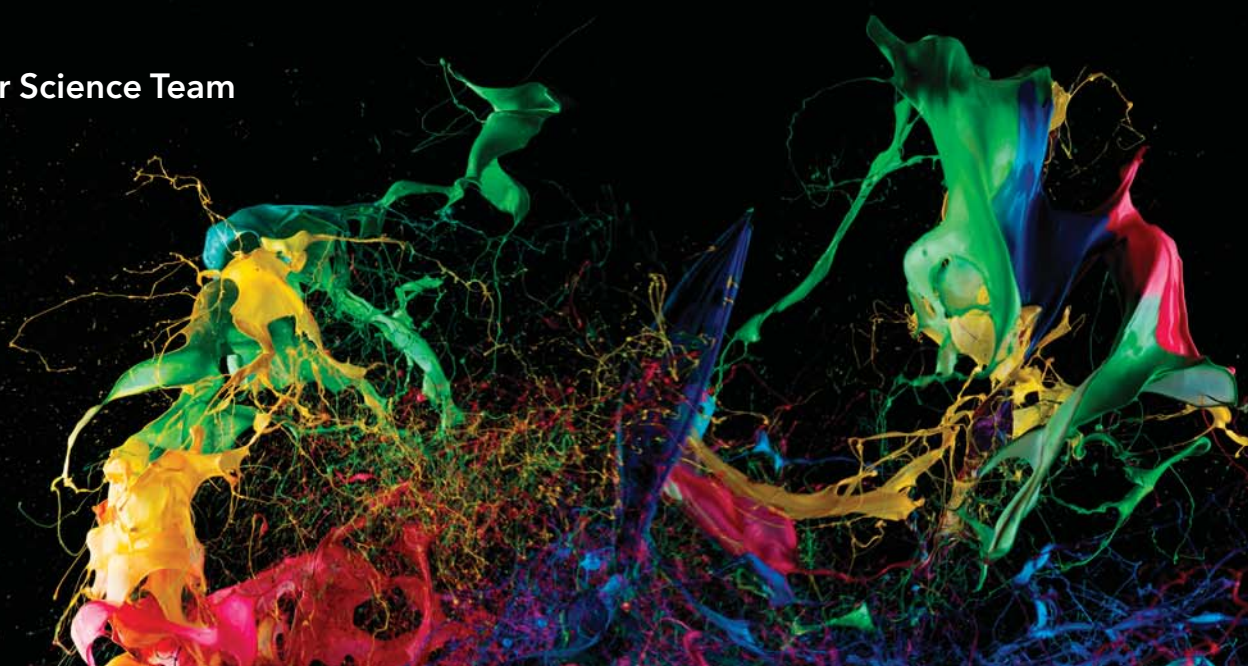
At Cambridge University Press we are committed to supporting teachers and progressing students during this transitional phase of education. This catalogue includes our brand new comprehensive suite of resources for A Level and GCSE Computer Science, as well as our popular Key Stage 3 Coding Club titles. Our resources are designed to engage and motivate learners of all abilities, support navigation of the new assessment objectives and exams, and prepare students for the challenges of the new specifications.

We also have a number of international resources for you to explore; Cambridge IGCSE® and International AS and A Level Computer Science, IGCSE ICT and International AS and A Level IT.

To find out more, please contact your local sales consultant who will be happy to answer your questions or visit [cambridge.org/education](https://www.cambridge.org/education).

Best wishes,

**The Computer Science Team**



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Digital resource



Print book and digital resource bundle

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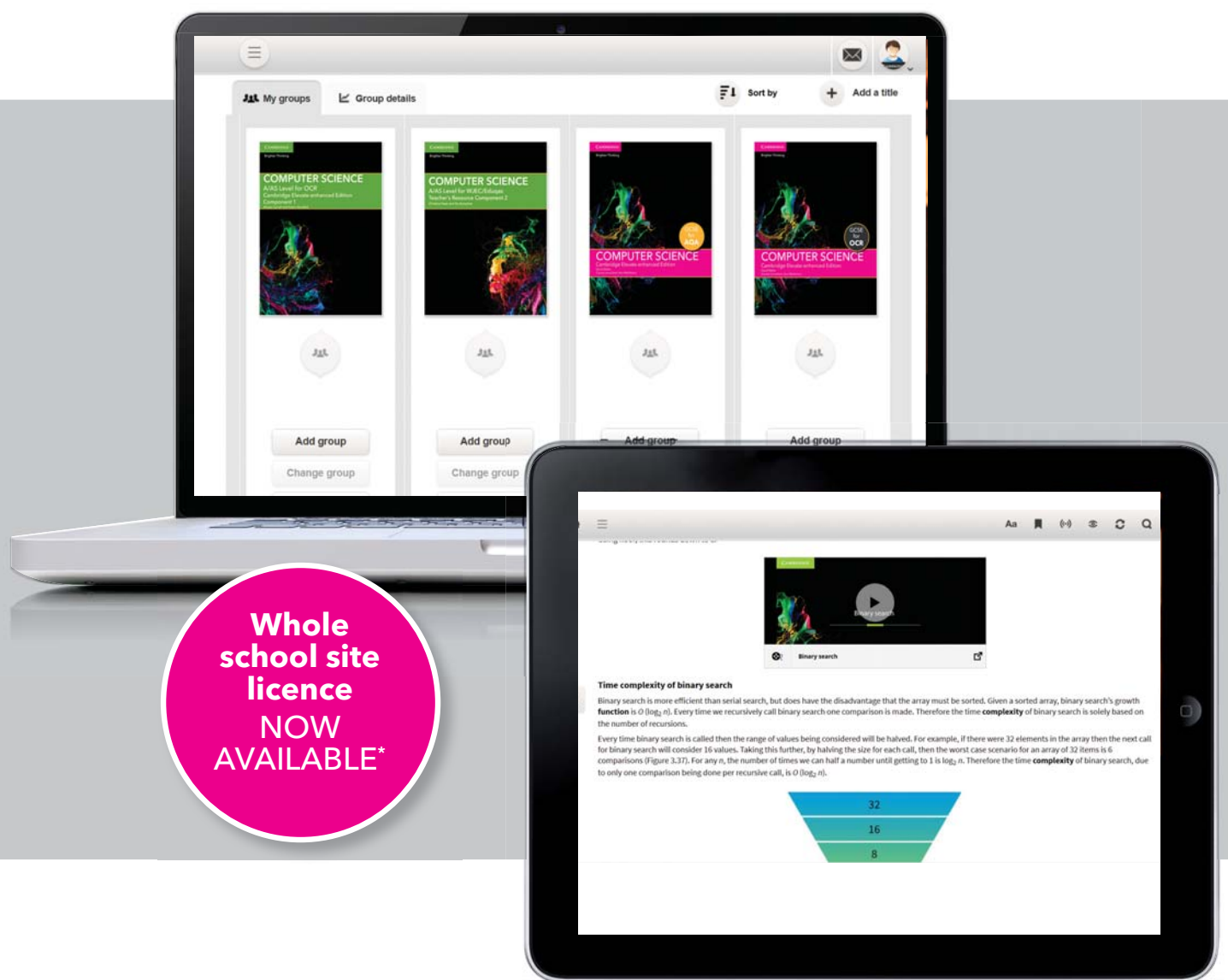


[facebook.com/BrighterThinking](https://www.facebook.com/BrighterThinking)



Cambridge Elevate is our brand new teaching and learning subscription service that provides you with a dynamic and flexible solution to deliver the new GCSE and A Level Computer Science qualifications.

Our Cambridge Elevate enhanced editions combine Student Book content and the Cambridge Elevate digital features to provide you and your students with an engaging, interactive and flexible approach to teaching and learning.



\*GCSE level only, an unlimited number of teachers and students within the same school.

### ► Rich digital content

A range of images, audios and interactive exercises to engage students and deepen their understanding.

### ► Flexible learning

Cambridge Elevate is available online through browsers or offline through the Cambridge Elevate app (suitable for iOS and Android).

### ► Flexible teaching

Teachers can link to external resources including VLEs, create differentiated student groups and send notes and messages directly to their students.

### ► Interactive

Students and teachers can annotate text, add web links and audio recordings, highlight keywords and change font size, providing a personalised solution to learning and teaching.

### ► A focus on further learning and career

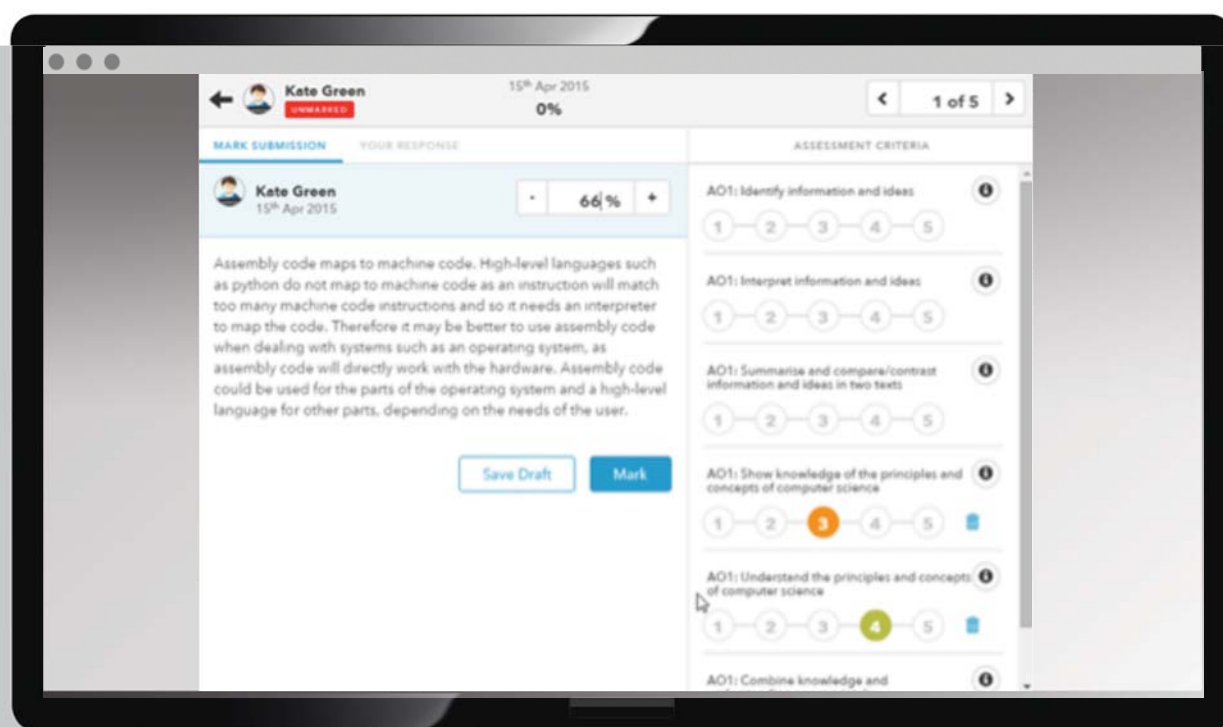
Real-life examples to help students relate their learning to everyday life.

### ► Exam practice

Interactive and exam-style questions to help students prepare for their exams.

### ► Free customer support

A wide range of support services including free webinars, Quick start guide, handy videos, FAQs and a dedicated technical support team.



### ► Track & report on students' progress

'Assess to Progress' provides progress tracking, expert marking and assessment at no extra cost.

Assignments and exam-style questions from our Student Books are linked to the DfE assessment objectives to provide a criterion to track and record students' progress, and example answers, suggestions and improvements are provided to help show students how they can improve.

# A/AS Level Computer Science for OCR

A new suite of digital resources tailored to the new OCR A/AS Level Computer Science specification. Our OCR A/AS Level resources prepare students for the new coursework component, demonstrate how Computer Science relates to everyday life, and support teachers in the transition from ICT to Computer Science.

- Created by an author team of practising teachers and industry advisors, including Computing At School master teachers.
- Rich digital assets highlight the historical and professional context of Computer Science and demonstrate complex concepts and processes.
- A strong focus on independent learning, computational thinking, programming and problem-solving skills.
- Differentiated to support students of all abilities with activities that stretch the more able and provide support to those who need it.

## A/AS Level Computer Science for OCR Components



### Cambridge Elevate enhanced editions

- Digital interactive teaching and learning resources covering all the knowledge, understanding and skills for Components 1 and 2 of the new OCR course.
- Designed to engage students and develop their computational thinking, knowledge and skills, and demonstrate how Computer Science is applied to everyday life.
- Contains rich digital assets including animated tutorials, video interviews and coding presentations to help students understand difficult concepts.
- Covers Python programming language and pseudocode.
- 'Assess to Progress' tool supports assessing, tracking and reporting of students' progress.

OCR Component 1 Cambridge Elevate enhanced edition (2 Years)

ISBN 9781107465510

OCR Component 2 Cambridge Elevate enhanced edition (2 Years)

ISBN 9781107465558



Animations explain difficult concepts or key features of a topic.

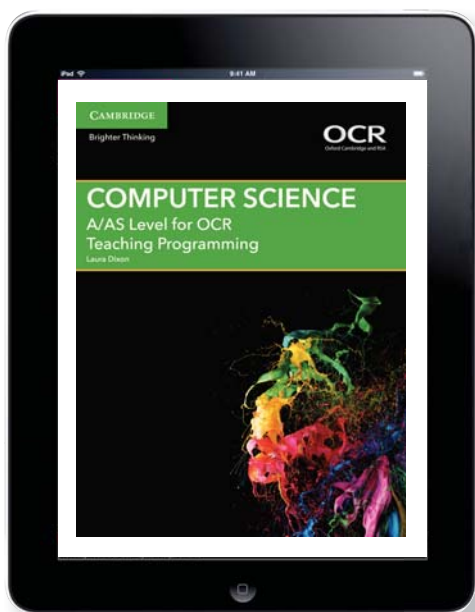
Feature box highlights application of Computer Science to everyday life.



Example code to facilitate teaching and learning of programming techniques.

Glossary of key vocabulary from all chapters.

Hints and reminders to aid students' revision, some include questions to prompt students' knowledge.



## Teaching Programming

- A teacher resource offering complete support for Component 3 of the new specification.
- Features a progressive and structured series of problems and lesson plans to help prepare students for the practical aspects of the course.
- Includes detailed lesson plans structured around a series of 20 differentiated problems progressing in difficulty, to stretch the more able and provide support for those who need it.
- Model solutions in pseudocode for every question to support teaching in various programming languages used in the classroom.

OCR Teaching Programming for Component 3 (2 Years)

**ISBN** 9781107465503



## Teacher's Resource

- FREE digital Teacher's Resource containing practical support and guidance for delivering the new AS and A Level Computer Science qualifications for Components 1 and 2.
- Mapped to the Cambridge Elevate enhanced editions, includes teaching ideas, advice and notes on each chapter covering pre-requisite learning.

OCR Component 1 Teacher's Resource Cambridge Elevate enhanced edition (2 Years)

**ISBN** 9781107496774 FREE with purchase of Component 1 Cambridge Elevate enhanced edition

OCR Component 1 Teacher's Resource Free Online

**ISBN** 9781107496767 FREE PDF download from our UK Schools website

OCR Component 2 Teacher's Resource Cambridge Elevate enhanced edition (2 Years)

**ISBN** 9781107531956 FREE with purchase of Component 2 Cambridge Elevate enhanced edition

OCR Component 2 Teacher's Resource Free Online

**ISBN** 9781107531963 FREE PDF download from our UK Schools website



# A/AS Level Computer Science for WJEC/Eduqas

A new suite of digital resources tailored to the new WJEC/Eduqas A/AS Level Computer Science specification. Our WJEC/Eduqas A/AS Level resources prepare students for the new coursework component, demonstrate how Computer Science relates to everyday life, and support teachers in the transition from ICT to Computer Science.

- Created by an author team of practising teachers and industry advisors, including Computing At School master teachers.
- Rich digital assets highlight the historical and professional context of Computer Science and demonstrate complex concepts and processes.
- A strong focus on independent learning, computational thinking, programming and problem-solving skills.
- Differentiated to support students of all abilities with activities that stretch the more able and provide support to those who need it.

## A/AS Level Computer Science for WJEC/Eduqas Components

### Cambridge Elevate enhanced editions

- Digital interactive teaching and learning resources covering all the knowledge, understanding and skills for Components 1 and 2 of the new WJEC/Eduqas course.
- Designed to engage students and develop their computational thinking, knowledge and skills, and demonstrate how Computer Science is applied to everyday life.
- Contains rich digital assets including animated tutorials, video interviews and coding presentations to help students understand difficult concepts.
- Covers Python 3, Visual Basic.NET, PHP and Java programming languages and pseudocode.
- 'Assess to Progress' tool supports assessing, tracking and reporting of students' progress.

WJEC/Eduqas Component 1 Cambridge Elevate enhanced edition (2 Years)

ISBN 9781107549418

WJEC/Eduqas Component 2 Cambridge Elevate enhanced edition (2 Years)

ISBN 9781107549425



Animations explain difficult concepts or key features of a topic.

Feature box highlights application of Computer Science to everyday life.

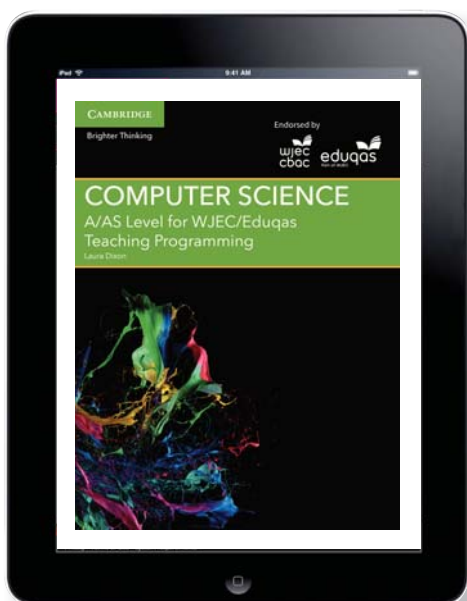


Example code to facilitate teaching and learning of programming techniques.

Glossary of key vocabulary from all chapters.

Hints and reminders to aid students' revision, some include questions to prompt students' knowledge.





## Teaching Programming

- A teacher resource offering complete support for Component 3 of the new specification.
- Features a progressive and structured series of problems and lesson plans to help prepare students for the practical aspects of the course.
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WJEC/Eduqas Teaching Programming for Component 3 (2 Years)

**ISBN** 9781107549487



## Teacher's Resource

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- Mapped to the Cambridge Elevate enhanced editions, includes teaching ideas, advice and notes on each chapter covering pre-requisite learning.

WJEC/Eduqas Component 1 Teacher's Resource Cambridge Elevate enhanced edition (2 Years)

**ISBN** 9781107549647 FREE with purchase of Component 1 Cambridge Elevate enhanced edition

WJEC/Eduqas Component 1 Teacher's Resource Free Online

**ISBN** 9781107549654 FREE PDF download from our UK Schools website

WJEC/Eduqas Component 2 Teacher's Resource Cambridge Elevate enhanced edition (2 Years)

**ISBN** 9781107549708 FREE with purchase of Component 2 Cambridge Elevate enhanced edition

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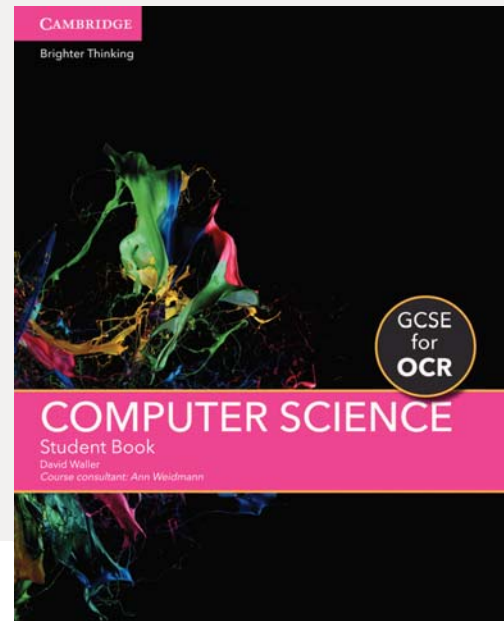
**ISBN** 9781107549715 FREE PDF download from our UK Schools website



# GCSE Computer Science for OCR

A new suite of print and digital GCSE Computer Science resources tailored to the new OCR GCSE Computer Science specification.

- Written by an experienced teacher and assessment leader.
- A strong focus on developing students' computational thinking, programming, problem-solving skills and mathematical concepts.
- Includes rich digital content, real-life examples and challenges to help students relate Computer Science to everyday life.
- Supports teachers with the delivery of the new specification and the transition from ICT to Computer Science.



## Learning outcomes

List of the learning objectives and the specification points covered in the chapter.

## Challenge

Helps focus students on real-life application of the skills and knowledge they will learn in the chapter.

## Real-life examples

Familiar real-life scenarios that help students to understand how their learning is important to everyday life.

## 1 Algorithms

### Learning outcomes

By the end of this chapter, you should be able to:

- explain what an algorithm is and create algorithms to solve specific problems
- use sequence, selection and iteration in algorithms
- use input, processing and output in algorithms
- express algorithms using flow charts and pseudocode
- analyse, assess and compare different algorithms
- create, name and use suitable variables
- use arithmetic, relational and Boolean operators
- use conditional statements.



**Challenge:** create an algorithm to help a taxi company calculate its fares

- By the end of this chapter, you should have a thorough knowledge of how algorithms can be used to solve complex problems and how they can be displayed using flow charts and pseudocode.
- Your challenge is to use this knowledge to help a taxi company calculate its fares.

### Why algorithms?

Algorithms run our world! In every area algorithms are used to decide what action should be taken in a particular circumstance and as computers can consider all the possibilities far more quickly than a human brain, they are becoming more important to the running of the world. Here are just a few examples.

- In a game of chess, when each player has made 3 moves, there are over 9 million possible moves available; after 4 moves there are over 288 billion possible moves. Computers have the ability to consider all these possible moves, far more quickly than humans. That is why no chess grandmaster has beaten a top computer chess algorithm since 2005.
- Algorithms are used by financial organisations to trade shares on the stock market. A computer following an algorithm can decide which deal to make far more quickly than a human and a split second difference can be worth millions of pounds.
- Closely guarded algorithms are used for Internet searches to make them quicker and the results more relevant to the user. They will even auto-complete the search terms based on previous searches.

# GCSE Computer Science OCR Components



## Student Book

Our OCR GCSE Computer Science Student Book uses an exciting and engaging approach to help students master underlying computing principles and concepts and develop their computational thinking, programming and problem-solving skills.

- Underpinned by computational thinking and designed to equip students with core strategies and concepts such as logic and algorithms.
- Coding challenges develop programming skills and help prepare students for the non-exam assessment.
- Contains contextual activities to support the less confident and open-ended challenges to stretch the more able.

### OCR Student Book

ISBN 9781316504031

### 1 Algorithms

#### What is an algorithm?

An algorithm is a step-by-step procedure for solving problems. It is something that can be followed by humans and computers.

We use algorithms to carry out everyday tasks, often without thinking about them. For example, an algorithm to solve the problem of getting ready for school might be:

Get out of bed.
Shower.
Get dressed.
Turn on kettle.
Put bread in toaster and turn on.
Wait for kettle to boil and make tea.
Wait for bread to toast, butter it and add marmalade.
Drink tea and eat toast.
Gather school books and put in bag.
Put on shoes and coat.
Leave the house.

#### Watch out

In an algorithm, the order in which the tasks are carried out is very important to its success or failure. For example, this algorithm would not be very successful if 'shower' was placed after 'get dressed'. The sequence is very important.

The algorithm shows the **sequence** of tasks. Different people will design different algorithms, as they will do things in a different order, meaning there can be many solutions to the same problem. Some of these tasks could also be further divided into **sub-tasks** as they may be made up of smaller steps.

For example, 'showering' could involve many different steps: turning on the shower, setting the correct temperature etc. If all the possible sub-tasks were included, the complete algorithm would get very large and complicated. In fact, it would fill the whole of this book!

#### Key terms

**sequence:** the order in which tasks are to be carried out  
**sub-tasks:** small steps making up a larger task

#### Activity 1.1

Create an algorithm for someone who has never made a cup of tea before to follow in order to make one successfully. Compare it with other members of your group and note any differences in sequence and sub-tasks.

#### Watch out

Boxes highlighting common misconceptions.

#### Key terms

Key terms are highlighted throughout.

#### Cambridge GCSE Computing Online

Links to corresponding digital activities that demonstrate skills, programming, and provide consolidation and self-assessment.

#### Activity

Regular exercises that allow students to put their learning into practice and investigate new ideas.

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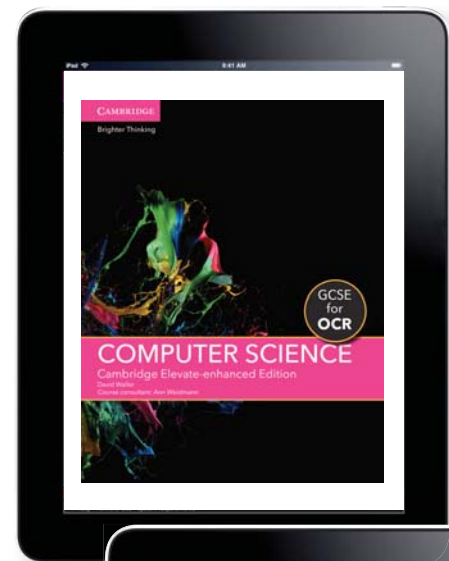
# GCSE Computer Science for OCR (cont.)



## Cambridge Elevate enhanced edition

This digital edition combines the content of our OCR Student Book and the Cambridge Elevate digital features to offer a dynamic and flexible solution to delivering the new GCSE Computer Science qualification.

- Rich digital content help students relate Computer Science to everyday life.
- Animated tutorials and coding presentations help students understand difficult concepts.
- Features a wide variety of practice problems, interactive worksheets and exam-style questions to help with exam preparation.
- Contains examples in Python and interactive guidance and answers which explain the coding language used.
- 'Assess to Progress' tool supports assessing, tracking and reporting of students' progress.



### OCR Cambridge Elevate enhanced edition School Site Licence (1 Year)\*

**1 Year** ISBN 9781316609965

### OCR Cambridge Elevate enhanced edition\*\*

**1 Year** ISBN 9781316609941

**2 Years** ISBN 9781316504055

### OCR Print Student Book plus Cambridge Elevate enhanced edition\*\*

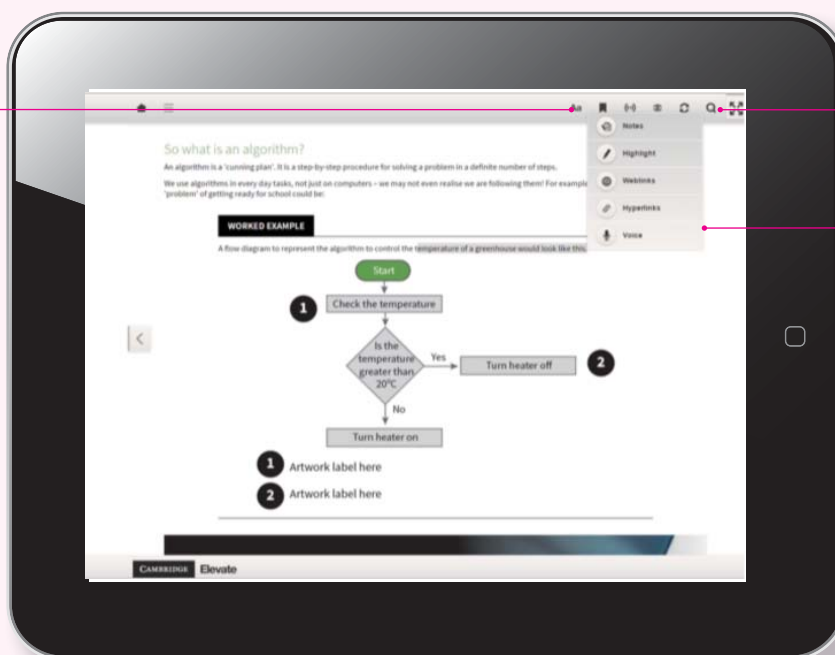
**2 Years** ISBN 9781316503997

\*Unlimited number of teachers and students within the same school.

\*\*Individual licences available.

Users change font size and style to adapt the content.

Teachers can add bookmarks to create direct links to content they want their students to see and download or upload content to their school's VLE.



Search functionality allows users to find the content they need easily.

Teachers and students can highlight important information, add notes, annotations, weblinks, hyperlinks and audio recordings.

Teachers can send notes and messages directly to their student groups.





## Teacher's Resource

Mapped to the Student Book, our FREE Teacher's Resource offers practical support in delivering the curriculum confidently, whether teachers are new to programming or specialists in need of time-saving resources and ideas.

- Features notes on each chapter including sections on learning outcomes, key vocabulary, common misconceptions, skills and coding and homework ideas.
- Includes easy-to-follow, practical teaching aids and ideas.
- Provides background knowledge for the assessment, assessment ideas and coding competence.
- Contains answers to questions featured in the Student Book.

### OCR Teacher's Resource Cambridge Elevate enhanced edition

ISBN 9781316504093 FREE with purchase of Cambridge Elevate enhanced edition

### OCR Teacher's Resource Free Online

ISBN 9781316504109 FREE PDF download from our UK Schools website



Skills and coding for non-specialist teachers.

Prompting questions to help teachers start conversations with students.

#### Chapter 1 Algorithms

##### LEARNING OUTCOMES

- By the end of this chapter students should be able to:
- explain what an algorithm is and create algorithms to solve specific problems
  - use sequence, selection and iteration in algorithms
  - use input, processing and output in algorithms
  - express algorithms using flow charts and pseudocode
  - analyse, assess and compare different algorithms
  - create, name and use suitable variables
  - use arithmetic, relational and Boolean operators
  - use conditional statements.

##### Introduction

###### What your students need to know

- No prior knowledge is expected for this chapter.
- Vocabulary
- Algorithm
- Sequence
- Selection
- Iteration
- Input, output and processing
- Flow chart
- Pseudocode
- Variable
- Identifier
- Constant
- Arithmetic operators
- Relational operators
- Boolean (logical) operators
- Nested operations

###### Common misconceptions and other issues

Students should be encouraged to use the formal conventions of creating flow diagrams and using pseudocode.

They should use meaningful variable identifiers also use indentation and commenting in their pseudocode.

The students will probably be unfamiliar with the arithmetic operators MOD and DIV.

The relational operators == and != will also need explanation as using '=' instead of '==' is a common syntax error.

The Boolean operators 'AND' and 'OR' can cause confusion as the statement 'I would like red ones and blue ones' would require the 'OR' operator when selecting from a list or array.

When using nested selection care must be taken in completing each block with an 'ENDIF' statement.

###### Skills and coding

- Maths skills

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#### GCSE Computer Science for OCR (Teacher's Resource)

- arithmetic operators
- order of operations - BIDMAS
- calculation of average.
- Coding skills:
  - use of pseudocode
  - declaring and assigning variables
  - selecting suitable identifiers
  - selection using 'if...then...else...else' statements
  - nested 'if' statements
  - use of 'switch/case' statements.

##### What is an algorithm?

This section introduces the concept of an algorithm and the three basic constructs - sequence, selection and iteration.

##### Prompting questions

- List, stage by stage, how you got to school today.
- What is a recipe?
- You have just bought a flat pack computer desk. How will you know how to fit it together?

##### Starters, plenaries, enrichment and assessment ideas

###### Starters and plenaries

- Complete the digital activity on Cambridge GCSE Computing Online.
- Following a simple algorithm to create a set shape - pupils could fill in the squares of squared paper to follow a pre-prepared algorithm e.g. start at a particular square, fill in three, turn right, fill in two etc. to represent a letter or number.
- Pupils could write down a list of ordered instructions to carry out an operation e.g. make a cup of coffee.

###### Enrichment activities

- Ask the students to investigate the algorithms used by chess programs and share dosing institutions.
- Ask the students to produce an algorithm to get from one part of the school to another. Compare algorithms to select the most efficient.

###### Assessment ideas

- Answer questions on worksheet - could also be used for homework.

###### Solutions to activities in student book

- Activity 1.1
- Activity 1.2

###### Worksheet answers

###### Worksheet 1

- An algorithm is a step-by-step procedure for solving a problem.
- The algorithm should be a step-by-step sequential description of the journey to school.
- Sequence.

###### Skills and coding for non-specialist teachers

###### Use of pseudocode

The pseudocode commands and key words are given in the OCR pseudocode guide.

The guide states:

*The following guide shows the format pseudocode will appear in the examined components. It is provided to allow you to give learners familiarity before the exam. Learners are not expected to memorise the syntax of*

2

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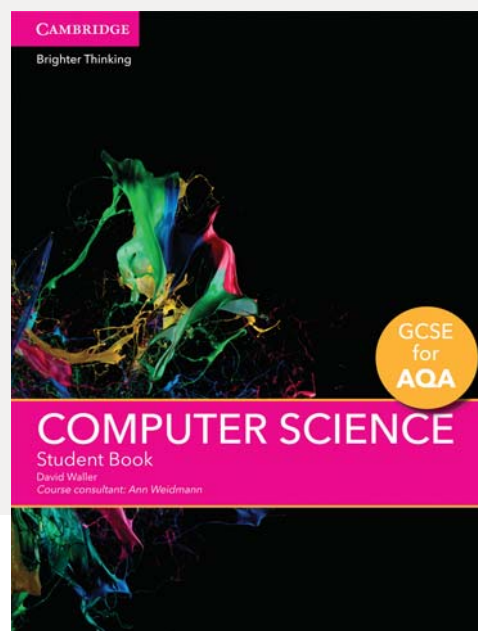
Additional assessment and activity ideas.

Vocabulary

# GCSE Computer Science for AQA

A new suite of print and digital GCSE Computer Science resources tailored to the new AQA GCSE Computer Science specification.

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- A strong focus on developing students' computational thinking, programming, problem-solving skills and mathematical concepts.
- Includes rich digital content, real-life examples and challenges to help students relate Computer Science to everyday life.
- Supports teachers with the delivery of the new specification and the transition from ICT to Computer Science.



## Learning outcomes

List of the learning objectives and the specification points covered in the chapter.

## Challenge

Helps focus students on real-life application of the skills and knowledge they will learn in the chapter.

## Real-life examples

Familiar real-life scenarios that help students to understand how their learning is important to everyday life.



## 1 Algorithms

### Learning outcomes

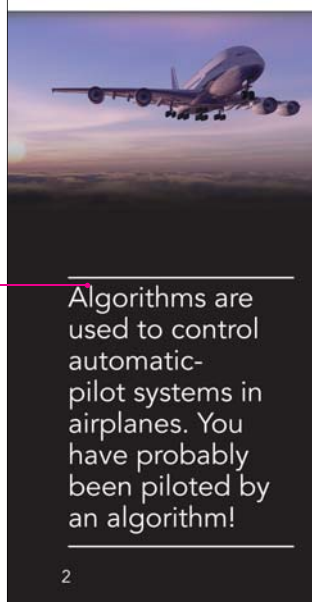
By the end of this chapter, you should be able to:

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- analyse, assess and compare different algorithms
- create, name and use suitable variables
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**Challenge:** create an algorithm to help a taxi company calculate its fares

- By the end of this chapter, you should have a thorough knowledge of how algorithms can be used to solve complex problems and how they can be displayed using flow charts and pseudocode.
- Your challenge is to use this knowledge to help a taxi company calculate its fares.



Algorithms are used to control automatic-pilot systems in airplanes. You have probably been piloted by an algorithm!

### Why algorithms?

Algorithms run our world! In every area algorithms are used to decide what action should be taken in a particular circumstance and as computers can consider all the possibilities far more quickly than a human brain, they are becoming more important to the running of the world. Here are just a few examples.

- In a game of chess, when each player has made 3 moves, there are over 9 million possible moves available; after 4 moves there are over 288 billion possible moves. Computers have the ability to consider all these possible moves, far more quickly than humans. That is why no chess grandmaster has beaten a top computer chess algorithm since 2005.
- Algorithms are used by financial organisations to trade shares on the stock market. A computer following an algorithm can decide which deal to make far more quickly than a human and a split second difference can be worth millions of pounds.
- Closely guarded algorithms are used for Internet searches to make them quicker and the results more relevant to the user. They will even auto-complete the search terms based on previous searches.

# GCSE Computer Science AQA Components

## Student Book

Our AQA GCSE Computer Science Student Book uses an exciting and engaging approach to help students master underlying computing principles and concepts and develop their computational thinking, programming and problem-solving skills.

- Underpinned by computational thinking and designed to equip students with core strategies and concepts such as logic and algorithms.
- Coding challenges develop programming skills and help prepare students for the non-exam assessment.
- Contains contextual activities to support the less confident and open-ended challenges to stretch the more able.

### AQA Student Book

ISBN 9781316504048

## 1 Algorithms

### What is an algorithm?

An algorithm is a step-by-step procedure for solving problems. It is something that can be followed by humans and computers.

We use algorithms to carry out everyday tasks, often without thinking about them. For example, an algorithm to solve the problem of getting ready for school might be:

Get out of bed.
Shower.
Get dressed.
Turn on kettle.
Put bread in toaster and turn on.
Wait for kettle to boil and make tea.
Wait for bread to toast, butter it and add marmalade.
Drink tea and eat toast.
Gather school books and put in bag.
Put on shoes and coat.
Leave the house.

### Watch out

In an algorithm, the order in which the tasks are carried out is very important to its success or failure. For example, this algorithm would not be very successful if 'shower' was placed after 'get dressed'. The sequence is very important.

The algorithm shows the **sequence** of tasks. Different people will design different algorithms, as they will do things in a different order, meaning there can be many solutions to the same problem. Some of these tasks could also be further divided into **sub-tasks** as they may be made up of smaller steps.

For example, 'showering' could involve many different steps: turning on the shower, setting the correct temperature etc. If all the possible sub-tasks were included, the complete algorithm would get very large and complicated. In fact, it would fill the whole of this book!

### ACTIVITY 1.1

Create an algorithm for someone who has never made a cup of tea before to follow in order to make one successfully. Compare it with other members of your group and note any differences in sequence and sub-tasks.

### Watch out

Boxes highlighting common misconceptions.

Key terms are highlighted throughout.

### Key terms

**sequence:** the order in which tasks are to be carried out  
**sub-tasks:** small steps making up a larger task

### Activity

Regular exercises that allow students to put their learning into practice and investigate new ideas.

# GCSE Computer Science for AQA (cont.)



## Cambridge Elevate enhanced edition

This digital edition combines the content of our AQA Student Book and the Cambridge Elevate digital features to offer a dynamic and flexible solution to delivering the new GCSE Computer Science qualification.

- Rich digital content help students relate Computer Science to everyday life.
- Animated tutorials and coding presentations help students understand difficult concepts.
- Features a wide variety of practice problems, interactive worksheets and exam-style questions to help with exam preparation.
- Contains examples in Python and interactive guidance and answers which explain the coding language used.
- 'Assess to Progress' tool supports assessing, tracking and reporting of students' progress.

### AQA Cambridge Elevate enhanced edition School Site Licence (1 Year)\*

**1 Year** ISBN 9781316609989

### AQA Cambridge Elevate enhanced edition\*\*

**1 Year** ISBN 9781316609972

**2 Years** ISBN 9781316504079

### AQA Print Student Book plus Cambridge Elevate enhanced edition\*\*

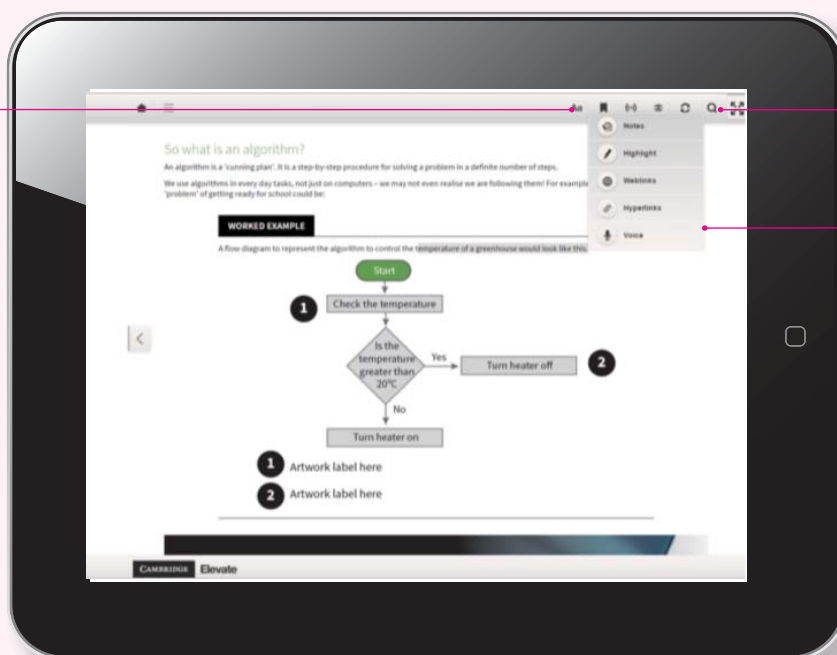
**2 Years** ISBN 9781316504017

\*Unlimited number of teachers and students within the same school.

\*\*Individual licences available.

Users change font size and style to adapt the content.

Teachers can add bookmarks to create direct links to content they want their students to see and download or upload content to their school's VLE.



Search functionality allows users to find the content they need easily.

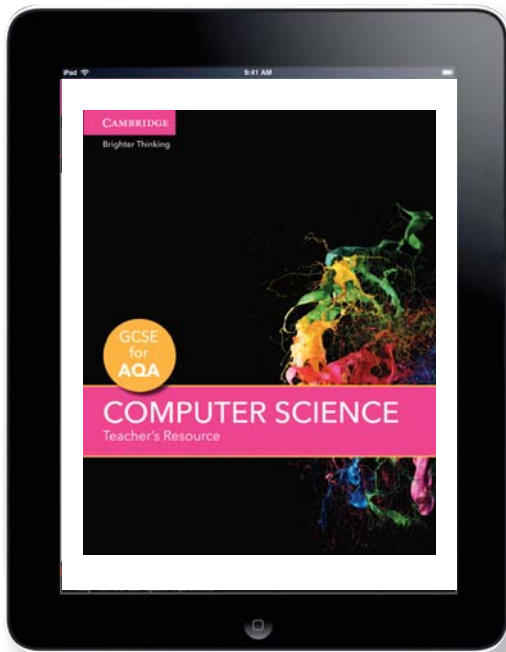
Teachers and students can highlight important information, add notes, annotations, weblinks, hyperlinks and audio recordings.

Teachers can send notes and messages directly to their student groups.





## Teacher's Resource



Mapped to the Student Book, our FREE Teacher's Resource offers practical support in delivering the curriculum confidently, whether teachers are new to programming or specialists in need of time-saving resources and ideas.

- Features notes on each chapter including sections on learning outcomes, key vocabulary, common misconceptions, skills and coding and homework ideas.
- Includes easy-to-follow, practical teaching aids and ideas.
- Provides background knowledge for the assessment, assessment ideas and coding competence.
- Contains answers to questions featured in the Student Book.

### AQA Teacher's Resource Cambridge Elevate enhanced edition

ISBN 9781316504116

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### AQA Teacher's Resource Free Online

ISBN 9781316504123

FREE PDF download from our UK Schools website

Skills and coding for non-specialist teachers.

Prompting questions to help teachers start conversations with students.

Additional assessment and activity ideas.

Vocabulary

### Chapter 1 Algorithms

#### LEARNING OUTCOMES

- By the end of this chapter students should be able to:
- explain what an algorithm is and create algorithms to solve specific problems
  - use sequence, selection and iteration in algorithms
  - use input, processing and output in algorithms
  - express algorithms using flow charts and pseudocode
  - analyse, assess and compare different algorithms
  - create, name and use suitable variables
  - use arithmetic, relational and Boolean operators
  - use conditional statements.

#### Introduction

##### What your students need to know

- No prior knowledge is expected for this chapter.
- Vocabulary
  - Algorithm
  - Sequence
  - Selection
  - Iteration
  - Input, output and processing
  - Flow chart
  - Pseudocode
  - Variable
  - Identifier
  - Constant
- Arithmetic operators
  - Relational operators
  - Boolean (logical) operators
  - Nested operations

##### Common misconceptions and other issues

Students should be encouraged to use the formal conventions of creating flow diagrams and using pseudocode.

They should use meaningful variable identifiers also use indentation and commenting in their pseudocode.

The students will probably be unfamiliar with the arithmetic operators MOD and DIV.

The relational operators == and != will also need explanation as using '=' instead of '==' is a common syntax error.

The Boolean operators 'AND' and 'OR' can cause confusion as the statement 'I would like red ones and blue ones' would require the 'OR' operator when selecting from a list or array.

When using nested selection care must be taken in completing each block with an 'ENDIF' statement.

##### Skills and coding

- Maths skills:

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#### GCSE Computer Science for OCR (Teacher's Resource)

- arithmetic operators
- order of operations - BIDMAS
- calculation of average.
- Coding skills:
  - use of pseudocode
  - declaring and assigning variables
  - selecting suitable identifiers
  - selection using 'if...then...elseif...else' statements
  - nested 'if' statements
  - use of 'switch/case' statements.

##### What is an algorithm?

This section introduces the concept of an algorithm and the three basic constructs - sequence, selection and iteration.

##### Prompting questions

- List, stage by stage, how you got to school today.
- What is a recipe?
- You have just bought a flat-pack computer desk. How will you know how to fit it together?

##### Starters, plenaries, enrichment and assessment ideas

###### Starters and plenaries

- Complete the digital activity on Cambridge GCSE Computing Online.
- Following a simple algorithm to create a set shape - pupils could fill in the squares of 'squared paper' to follow a pre-prepared algorithm e.g. start at a particular square, fill in three, turn right, fill in two etc. to represent a letter or number.
- Pupils could write down a list of ordered instructions to carry out an operation e.g. make a cup of coffee.

###### Enrichment activities

- Ask the students to investigate the algorithms used by chess programs and share dealing institutions.
- Ask the students to produce an algorithm to get from one part of the school to another. Compare algorithms to select the most efficient.

###### Assessment ideas

- Answer questions on worksheet - could also be used for homework.

###### Solutions to activities in student book

- Activity 1.1
- Activity 1.2

###### Worksheet answers

###### Worksheet 1

- An algorithm is a step-by-step procedure for solving a problem.
- The algorithm should be a step-by-step sequential description of the journey to school.
- Sequence.

###### Skills and coding for non-specialist teachers

###### Use of pseudocode

The pseudocode commands and key words are given in the OCR pseudocode guide.

The guide states:

The following guide shows the format pseudocode will appear in the examined components. It is provided to allow you to give learners familiarity before the exam. Learners are not expected to memorise the syntax of

2

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# Cambridge GCSE Computer Science Getting Started MOOC



With the content structure aligned to our GCSE Computer Science for OCR Student Book, this MOOC (Massive Open Online Course) is a great way to introduce the content studied through the GCSE course. As a teacher, you can use it outside of the classroom in preparation for your next lesson. This MOOC has been created by the Cambridge based partnership between the exam board OCR and Cambridge University Press.

**FREE**

## Features:

- Tailored to the OCR GCSE Computing (J275) and Computer Science (J276) curricula.
- Written and presented by subject experts.
- Contains interactive activities and supporting resources that will give users valuable insight into computing and computer science.
- Courses are designed for 14-16 year olds, however, they are both free and open to everyone.

**Access on [cambridgegcsecomputing.org](https://cambridgegcsecomputing.org)**

# Key Stage 3 Coding Club



A unique series of coding books that guides young programmers to create their own versions of familiar games and challenges them to adapt and experiment with programs.

- Levels that build on each other allowing flexibility for students to choose topics of interest.
- An appealing design, fun approach and simple explanations throughout.
- Written by a practising teacher, containing objectives, summaries and challenges to engage students.
- Gives students the chance to experiment and create their own versions of familiar games.
- Can be used on Windows, Macs or Linux based systems and therefore compatible with Raspberry Pi.
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## Python Basics (Level 1)

This lively book is an introduction to the world of coding and to Python 3.

- Young programmers will learn how to code and customise several fun applications.
- The fun challenges and Quick Quizzes help to consolidate new skills.
- The free companion website provides the full source code for all the projects and challenges.

Python Basics (Level 1)

ISBN 9781107658554



## Python: Programming Art (Level 1)

Students can create artistic applications to explore their creative side!

- Reinforces students' programming knowledge from Python Basics.
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## Python: Next Steps (Level 2)

Take Python coding to the next level!

- Aimed at students who have some basic programming experience and are ready to move on to slightly more challenging material.
- Students will learn essential new programming ideas to make them much more accomplished coders.

Python: Next Steps (Level 2)

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## Coding Club Python: Interactive Adventures Supplement 2

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- Provides extra ideas and challenges at the end of each chapter to encourage students to go further with their learning.

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## Python: Building Big Apps (Level 3)

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# Coding Club Elevate enhanced editions

Our unique series of coding books are now available for schools subscriptions on Cambridge Elevate, our digital learning and teaching platform, offering a cost effective solution to schools.

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# Black Flag: A Coding Club Mission



Written to create coding interest, and build on knowledge and understanding of coding skills for Key Stage 3 students, *Black Flag* is no ordinary novel. It allows readers to play along with the story by completing a number of coding challenges via the FREE companion website ([cambridge.org/codingclub-blackflag](http://cambridge.org/codingclub-blackflag)).

- Using this unique combination of storytelling and coding, *Black Flag* encourages avid readers to become coders, and engages avid coders in literature.
- The puzzles in the book only require basic knowledge of programming.
- Completing Python Basics or looking at background information provided online will provide this knowledge.
- Working through the puzzles will consolidate coding skills.
- Story can be read as a standalone novel if this is preferred. Puzzles fit in alongside.
- Written by an experienced young adult fiction author.



Black Flag: A Coding Club Mission

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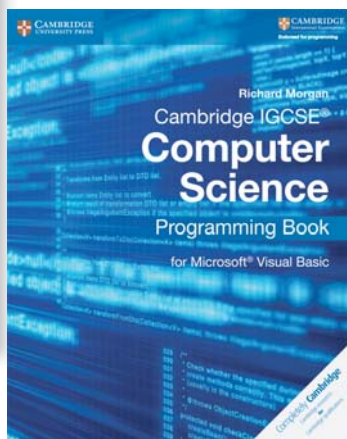
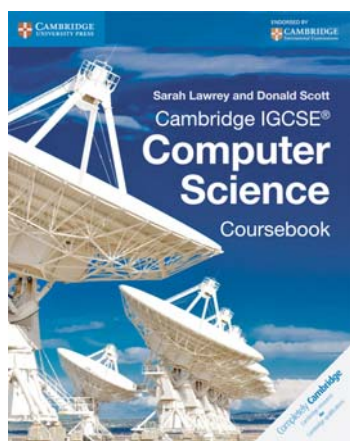
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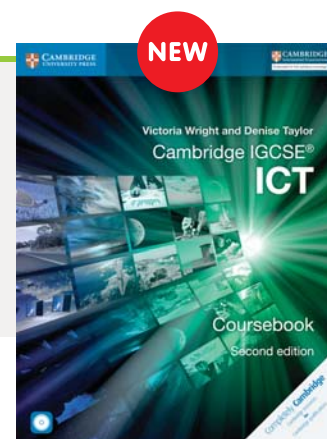
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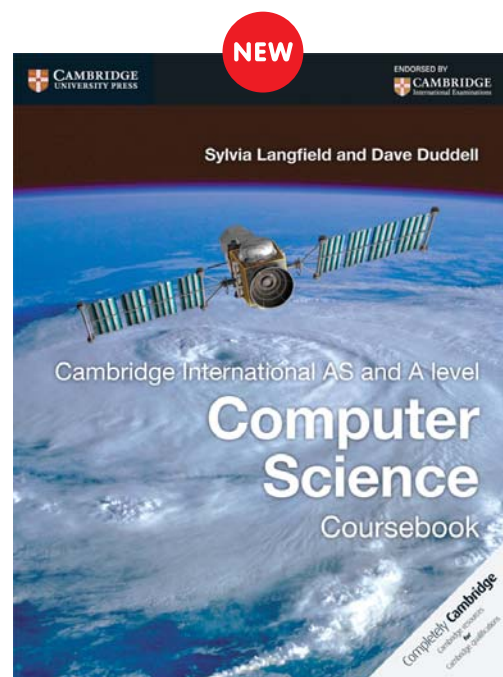
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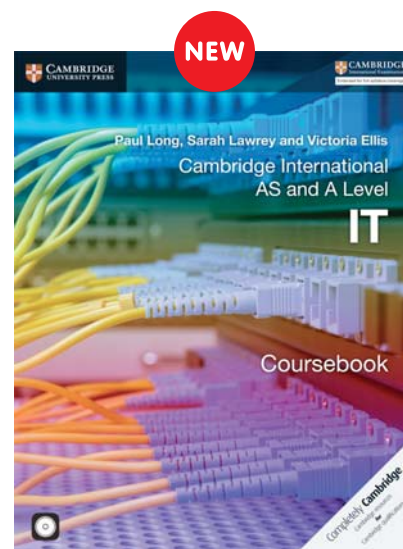
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<b>Colleen McGuinness</b> 07774 239094 cmcguinness@cambridge.org	Blackburn with Darwen, Blackpool, Bolton, Bury, Cumbria, Lancashire, Manchester, Oldham, Rochdale, Salford, Stockport, Tameside, Trafford, Warrington, Wigan.
<b>Jan Lawson</b> 07984 654535 jlawson@cambridge.org	Darlington, Doncaster, Durham, East Riding of Yorkshire, Gateshead, Hartlepool, Kingston upon Hull, Middlesbrough, Newcastle upon Tyne, North Lincolnshire, North Tyneside, North Yorkshire, Northumberland, Redcar and Cleveland, South Tyneside, Stockton-on-Tees, Sunderland, York.
<b>Vanessa Sganzerla</b> 07946 604646 vsganzerla@cambridge.org	Birmingham, Coventry, Dudley, Herefordshire, Sandwell, Shropshire, Solihull, Walsall, Warwickshire, Wolverhampton, Worcestershire.
<b>Dawn Needham</b> 07774 239107 dneedham@cambridge.org	Cheshire East, Cheshire West and Chester, Derby, Derbyshire, Halton, Knowsley, Liverpool, Sefton, Staffordshire, St. Helens, Stoke-on-Trent, Telford and Wrekin, Wirral.
<b>Sam Day</b> 07774 239096 sday@cambridge.org	Cambridgeshire, Leicester, Leicestershire, Lincolnshire, Norfolk, North East Lincolnshire, Peterborough, Rutland, Suffolk.
<b>Juli King</b> 07946 604692 jking@cambridge.org	Buckinghamshire, Hampshire, Northamptonshire, Oxfordshire, Portsmouth, Southampton, Swindon, West Berkshire, Wiltshire.
<b>Lisa Wrenn</b> 07983 517596 lwrenn@cambridge.org	Bedford Borough, Central Bedfordshire, Essex, Hertfordshire, Luton, Milton Keynes, Southend-on-Sea, Thurrock.
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